3.2.10 WASTE MANAGEMENT

This section outlines the major environmental regulatory structure and ongoing waste management activities for Hanford. A more detailed discussion of the ongoing waste management operations is provided in Section E.2.1. Table 3.2.10–1 presents a summary of waste management activities at Hanford for 1993.

The Department is working with Federal and State regulatory authorities to address compliance and cleanup obligations rising from its past operations at Hanford. The DOE is engaged in several activities to bring its operations into full regulatory compliance. These activities are set forth in negotiated agreements that contain schedules for achieving compliance, with applicable requirements and financial penalties for nonachievement of agreed-upon milestones.

The EPA placed Hanford on the National Priorities List (NPL) on November 3, 1989. In accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), DOE has entered into the Tri-Party Agreement with EPA and the State of Washington to govern the environmental compliance and cleanup of Hanford. Hanford has been divided into four aggregate waste sites (100, 200, 300, and 1100 Areas). An aggressive environmental restoration program is underway involving all areas of the site, using priorities established in the Tri-Party Agreement.

Hanford is the only DOE site with a preexisting agreement (Tri-Party Agreement) that meets the legal requirements specified under *Federal Facility Compliance Act*. Having this agreement exempts Hanford from having to develop a site treatment plan. This exemption is supported by written exemptions from the State of Washington and EPA. Both agencies determined that the *Report on Hanford Site Land Disposal Restrictions for Mixed Waste*, required by the Tri-Party Agreement, meets the intent of a site treatment plan. Hanford manages spent nuclear fuel and the following waste categories: high-level, TRU, low-level, mixed, hazardous, and nonhazardous. A discussion of the waste management operations associated with each of these categories follows.

Spent Nuclear Fuel. On April 29, 1992, DOE decided to discontinue reprocessing spent nuclear fuel solely to recover valuable materials. After the completion of several ongoing programmatic and site-specific reviews pursuant to NEPA, DOE will make decisions concerning the treatment and stabilization of the current Hanford inventory of spent nuclear fuel. Currently, spent N-Reactor, Shippingport Reactor, FFTF, and miscellaneous nuclear reactor fuel is stored in water-filled basins. Since spent nuclear fuel is not classified as waste, its management does not come under the regulations that apply to hazardous wastes, but instead is regulated by DOE Orders. Decisions concerning future receipt and management of spent nuclear fuel at Hanford will be made in accordance with the amended ROD published in the *Federal Register* on March 8, 1996 (61 FR 9441), for the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS-0203-F). The ROD specifies that spent nuclear fuel will be managed at Hanford, INEL, or SRS. Hanford production reactor fuel will remain at Hanford. As of 1995, Hanford has 2,133 t (2,351 tons), or 81 percent, of the total DOE existing spent fuel inventory. According to this ROD, a total of 12 shipments of non-Hanford produced reactor spent fuel will be sent from Hanford to INEL. Each shipment, either by truck or by rail, is assumed to consist of one shipping container. Hanford will not receive any additional fuel. As a result of this action, and assuming no final disposition, by the year 2035 Hanford will have 2,132 t (2,350 tons), or 78 percent, of the total existing DOE redistributed and newly generated inventory in the form of production reactor spent nuclear fuel (61 FR 9441).

A follow-on tiered, site-specific NEPA analysis for the management of the spent nuclear fuel from the K Basins was published in January 1996, *Final Environmental Impact Statement, Management of Spent Nuclear Fuel from the K Basins at the Hanford Site, Richland, Washington* (DOE/EIS-0245). Based on the analysis, an ROD was published in March 1996 (61 FR 10736). The decision consists of removing the spent nuclear fuel from the basins, vacuum drying, conditioning and sealing the spent nuclear fuel in inert-gas

Table 3.2.10–1. Spent Nuclear Fuel and Waste Management Activities at Hanford Site

Category	1993 Generation (m^3)	Treatment Method	Treatment Capacity (m^3/yr)	Storage Method	Storage Capacity (m^3)	Disposal Method	Disposal Capacity (m^3)
Spent Nuclear Fuel	None	Encapsulation	Planned	Reactor Basins. Non-Hanford production reactor spent fuel to be sent to INEL	2,133 t[a]	None—HLW Program in the future	NA
High-Level							
Liquid	None	Evaporation[b,c]	50,000[c]	Tank Farm	146,000[d]	NA	NA
Solid	None	NA	NA	NA	NA	None—HLW Program in the future	NA
Transuranic							
Liquid	None	See HLW	See HLW	Tank Farm	See HLW	NA	NA
Solid	271	None	NA	Containers on asphalt pads	15,370	None—WIPP or alternate facility in the future	None
Mixed Transuranic							
Liquid	0	See HLW	See HLW	Tank Farm	See HLW	NA	NA
Solid	98	None	NA	Containers on asphalt pads	15,370	None—WIPP or alternate facility in the future	None
Low-Level							
Liquid	None	Evaporation, separation, solidification	Evaporator in service, new vitrification facilities planned	None	NA	NA	NA
Solid	3,390	Compaction	4,000[e]	Not Stored	NA	Burial	902,900[f]
Mixed Low-Level							
Liquid	3,760	Evaporation, ion exchange[c]	50,000	Storage tanks, basins planned	446,500[g]	None	NA
Solid	1,505[h]	None	NA	RCRA facility, retrievable	1,218,700	Landfill, LLW Burial Grounds 218-E-NN	See solid LLW
Hazardous							
Liquid	See solid	None	NA	RCRA building	See solid	Commercial[i]	NA

Table 3.2.10–1. Spent Nuclear Fuel and Waste Management Activities at Hanford Site—Continued

Category	1993 Generation (m^3)	Treatment Method	Treatment Capacity (m^3/yr)	Storage Method	Storage Capacity (m^3)	Disposal Method	Disposal Capacity (m^3)
Solid	560[j]	None	NA	RCRA building	127	Commercial[i]	NA
Nonhazardous (Sanitary)							
Liquid	246,000[k]	None	NA	None	NA	Septic tanks, french drains	Expandable
Solid	5,107	None	NA	None	NA	Richland Sanitary Landfill	Expandable
Nonhazardous (Other)							
Liquid	Included in sanitary	None	NA	None	NA	Percolation ponds, leachfields	Expandable
Solid	Included in sanitary	None	NA	None	NA	Landfill	Expandable

[a] Spent nuclear fuel is normally expressed in metric tons not cubic meters.

[b] Vitrification planned.

[c] 242-A Evaporator restarted in April 1994 after upgrades were completed. Assumes 242-A Evaporator as treatment method for liquid HLW and liquid TRU and mixed TRU.

[d] Consists of HLW and liquid TRU wastes in Double-Shell Tanks; Pu recovery and extraction aging waste. Includes 241-AN, 241-AP, 241-AW, 241-AY, 241-AZ, and 241-SY Tank Farms.

[e] Compaction by LLW Compactor (213-W).

[f] Includes the LLW Burial Grounds (unit 218-E-NN) and Low-Level Mixed Waste Disposal Facility (Project W-025).

[g] Assumes storage of liquid mixed LLW in tanks and planned basins.

[h] Consists of 1,500 m^3 of RCRA-regulated mixed LLW and 8.2 t of *Toxic Substances Control Act*-regulated mixed LLW. Volume estimate for TSCA-regulated mixed LLW was made based on a density factor of 1,500 kg/m^3.

[i] Offsite at RCRA facility.

[j] Consists of 628 t (RCRA-regulated), 72.8 t (State-regulated), and 139 t (TSCA-regulated). A volume estimate was made based on a density factor of 1,500 kg/m^3 for solids.

[k] No data. Estimate made based on employment of 14,856 and 30 gal/person/day for 250 days.

Note: NA=not applicable.

Source: 61 FR 9441; DOE 1993h; DOE 1994d; DOE 1994k; HF DOE 1993a; HF MMES 1993a; HF WHC 1995c; ORNL 1993a.

filled canisters for dry vault storage in a new facility, to be built at Hanford, for up to 40 years pending decisions on ultimate disposition.

High-Level Waste. High-level waste was generated in the recovery of uranium and Pu from spent fuel generated in the production reactors. All of this radioactive waste is considered mixed waste because of its toxic and hazardous constituents as defined by RCRA. It must be remotely handled because of its high radiation levels. The waste was generated as liquids and sludges and stored in underground tanks where the sludges and salts in the liquid have precipitated out of solution as porous solids (called salt cake) and settled to the bottom of the tanks. The liquid above the solids has been pumped from the older, single-shelled tanks into newer, double-shelled tanks. The liquids that remain in the porous salt cake will be removed by boring holes through the salt cake and extracting liquids from near the tank bottoms. The wastes are segregated and handled according to their hazardous nature (corrosivity, chemical stability, heat generation rates), and require special monitoring and venting. Cooling is needed for some of these wastes. The wastes are concentrated by evaporation and returned to the tanks for storage until final processing to a form suitable for disposal in a Federal repository. It is planned to vitrify HLW water-soluble sludges and selected radionuclides separated from liquids retrieved from the tanks. Vitrification of all waste from tanks is expected to be completed by 2028. In addition to this liquid and solid HLW, an inventory of encapsulated Cs and Sr is stored in the Waste Encapsulation and Storage Facility in a water-cooled pool. Some of this material was used as irradiation sources in, for example, radiography and food irradiation. [Text deleted.]

Transuranic Waste. Before 1970, TRU waste was buried in near-surface trenches. These wastes will require retrieval, segregation, processing, certification, and packaging before their final disposal. At the same time, the burial sites themselves will require extensive remediation. TRU wastes generated since 1970 have been separately stored in near-surface trenches (both lined and unlined) or in aboveground buildings. These wastes will also require assay, recertification, and possibly repackaging. Some TRU wastes generated since 1986 have been packaged and certified to the WIPP WAC. The best available treatment technologies will be utilized, as required, on a case-by-case basis, to process the retrieved wastes before repackaging and certification for WIPP. Storage facility expansion for these wastes at the Hanford Site Central Waste Complex is anticipated as remedial operations continue. Treatment of contact-handled TRU wastes will be provided in the future at the Waste Retrieval and Processing Facility. The waste in the underground storage tanks described in the previous HLW section contains some Pu. The final disposition of this waste awaits the development of technology and agreements with stakeholders and regulatory bodies. All currently generated contact-handled TRU waste is being placed in above-grade storage buildings at the Hanford Site Central Waste Complex and the TRU Storage and Assay Facility. TRU wastes will be maintained in storage until a suitable disposal facility is qualified for TRU waste disposal. Hanford would develop the appropriate treatment capabilities to meet the criteria of the designated repository. Mixed TRU waste quantities are included in the TRU waste category, since all these wastes are destined for ultimate disposal in WIPP depending on decisions made in the ROD associated with the supplemental EIS being prepared for the proposed continued phased development of WIPP for disposal of TRU waste.

Low-Level Waste. Low-level waste is generated when separated from HLW, TRU waste, and mixed wastes in the processing of tank wastes, and also from remediation activities. Solid LLW is accumulated at the originating sites, compacted, and shipped to the Low-Level Burial Ground in the Hanford Central Waste Complex located in the 200 West Area. Additional LLW is received from offsite generators and disposed of in a series of unlined near-surface trenches. The LLW resulting from the tank waste remediation system waste preteatment program will be vitrified by the end of 2028; as a near-term contingency, the Grout Facility will be maintained in a standby condition. The vitrifed LLW will be disposed of onsite in the 200 Area at Hanford by the tank waste remediation system program.

Mixed Low-Level Waste. Ninety-nine percent of the mixed waste at Hanford is contained in tank farms. The only treatment facility currently in place for these wastes is the 242-A Evaporator, which operates to reduce the volume of these wastes. Solid waste is segregated by its hazardous characteristics (ignitability, corrosivity,

reactivity, and toxicity) and stored in buildings in the mixed waste storage facility. Defueled submarine reactor compartments continue to be received and disposed of in earthen trenches. These compartments have contained polychlorinated biphenyls (PCBs), but the Navy has a program to remove PCBs before the compartment disposal. Previously disposed mixed waste will be evaluated, treated, and disposed of according to designated criteria. Facilities completed or under construction to treat mixed wastes at Hanford are the Effluent Retention Facility, Effluent Treatment Facility (ETF) (filtration, oxidation, and ion exchange), 200 and 300 Area Treated Effluent Disposal Facility, LLW Vitrification Facility (stabilization), and the Waste Receiving and Processing Facility. Some of these facilities are scheduled to begin operations before the year 2000 to meet legally obligated milestones established in the Tri-Party Agreement and in consent orders.

Hazardous Waste. Hazardous waste is generated by various activities at PNL and from remediation and maintenance processes onsite. Except for the Interim Hazardous Waste Treatment Facility, which performs distillation, neutralization, and solidification, there are no treatment facilities for hazardous waste at Hanford; therefore, these wastes are accumulated in satellite storage areas (for less than 90 days) or at interim RCRA-permitted facilities, such as the Nonradioactive Dangerous Waste Storage Facility (Building 616), and at PNL (Building 305-B). The waste is shipped offsite by truck using DOT-approved transporters for treatment and disposal at RCRA-permitted facilities. A facility is being planned at PNL to dispose of the small volume of PNL hazardous waste and to be used for treatment technology development and demonstration.

Nonhazardous Waste. Wastewater from the process areas is treated in the 200 West Area Treatment Facility and then discharged to percolation ponds. In the future, these waste streams will be processed in an integrated liquid effluent system using a combination of local and central treatment systems. Sanitary wastewater is discharged to individual septic tanks and subsurface disposal systems. No data are collected on these waste streams. New systems will be added as processes move to different areas of the site. Sanitary wastes are estimated from standard engineering data for Hanford. Nonhazardous solid wastes are disposed of in the 600 Area central landfill. In October 1995, it was announced that DOE and the city of Richland reached an agreement to send the site's nonregulated and nonradioactive solid wastes to the Richland Sanitary Landfill. Coal waste is disposed of in landfills near the 200 East and 200 West Area powerhouses.